

ADDITIONAL NOTES ON THE GENUS AVICENNIA. XI

Harold N. Moldenke

AVICENNIA L.

Additional bibliography: Engl., Syllab. Pflanzenfam., ed. 2, 189 (1898), ed. 3, 188 (1903), ed. 5, 193 (1907), and ed. 6, 198. 1909; Gilg in Engl., Syllab. Pflanzenfam., ed. 7, 314 & 315. 1912; R. T. Baker, Journ. Proceed. Roy. Soc. N. S. Wales 49: 257—281. 1916; Gilg. in Engl., Syllab. Pflanzenfam., ed. 8, 319. 1919; Fedde & Schust. in Just, Bot. Jahresber. 44: 253. 1922; Gilg in Engl., Syllab. Pflanzenfam., ed. 9 & 10, 340. 1924; Kräusel in Just, Bot. Jahresber. 44: 759—760. 1924; Fedde in Just, Bot. Jahresber. 44: 1377. 1927; Diels in Engl., Syllab. Pflanzenfam., ed. 11, 339. 1936; M. F. Baker, Fla. Wild Fls., ed. 2, imp. 1, 190. 1938; Lugo & Snedaker in R. F. Johnston, Ann. Rev. Ecol. Syst. 5: 40, 43, 45, 50, & 54. 1974; Gaussen, Legris, Meher-Homji, Fontale, Pascal, Chandrahassan, Delacourt, & Troy, Trav. Sect. Scient. Techn. Inst. Franç. Pond. Hors Ser. 14: 37 & 82. 1975; Von Erffa & Geister, Mitt. Inst. Colombo-Aleman. Invest. Cient. Punta de Betin 8: 176—179, pl. 7. 1976; Anon., Biol. Abstr. 63: 6131. 1977; Moldenke, Phytologia 36: 408—412. 1977.

AVICENNIA GERMINANS (L.) L.

Additional bibliography: Lugo & Snedaker in R. F. Johnston, Ann. Rev. Ecol. Syst. 5: 40 & 45. 1974; Von Erffa & Geister, Mitt. Inst. Colombo-Aleman. Invest. Cient. Punta de Betin 8: 176—179, pl. 7. 1976; Anon., Biol. Abstr. 63: 6131. 1977; Moldenke, Phytologia 36: 410—412. 1977.

Additional illustrations: Von Erffa & Geister, Mitt. Inst. Colombo-Aleman. Invest. Cient. Punta de Betin 8: 178, pl. 7. 1976.

Von Erffa & Geister (1976) refer to remains of this species having been found in the Holocene formations in Florida and in Mexico. However, the remains found by them in Colombia are more likely those of Rhizophora mangle.

The corollas on Dwyer & Pippin 10030 are said to have been "white", taken from trees only "to 4 ft." tall, the leaves rather more elongate than usual, on Correll 47404 they were "cream-color", and on Correll & Correll 42342 "creamy-white".

Lakela and her associates (1976) assert that A. germinans in Florida inhabits coastal lagoons in the mangrove belt, flowering all year there. Laurence & Mohammed (1876) refer to the species as a "prolific nectar yielder.....whose honey shows the two locally uncommon features of clarity and a tendency to crystallize" in Trinidad & Tobago.

The Pohl & Davidse 10588a, distributed as A. germinans, actually is A. bicolor Standl., H. M. Curran 140 is A. germinans var. cumanensis (H.B.K.) Moldenke, Budowski 98A-18, Curran 2032 &

2032-19, Fournier 81, Holm-Nielsen, Jeppesen, Løjtnant, & Øllgaard 7261, D. H. Knight 1032, Kennedy 2281, Kuntze s.n. [Trinidad, IV. 74], Romero-Castañeda 7275, and Simpson & Schunke V. 601 are A. germinans var. guayaquilensis (H.B.K.) Moldenke, Britton & Britton 2595, Britton, Hazen, & Mendelson 541, Hahn 759, R. C. Marshall s. n. [Herb. Trin. Bot. Gard. 12651], Nadeaud s.n. [Marais salé de Victhersby, XI.1862], and Othmer s.n. are A. schaueriana Stapf & Leechman, Killip & Cuatrecasas 38660 is A. tonduzii Moldenke, L. M. Andrews 911 is Licania michauxii Prance, and Norris & Taranto 13327 is Laguncularia racemosa Gaertn.

Avicennia officinalis ♂ lanceolata Kuntze and A. officinalis var. lanceolata Kuntze, previously included by me in the synonymy of typical A. germinans, definitely belongs to that of var. guayaquilensis instead.

Additional citations: FLORIDA: Hillsborough Co.: Lakela 24616 (Ld, Ld). Monroe Co.: Perdue & Blum 4471a (Ld). Sanibel Island: Brumbach 7904 (N). TEXAS: Cameron Co.: Webster & Wilbur 3035 (Ml). Brazos Santiago Island: R. Runyon 2812 (Au—268808). Clark Island: Lundell & Lundell 8760 (Ld). MEXICO: Sinaloa: Hernandez X. 676 (Ld). Veracruz: Ventura A. 5226 (Ld). Yucatán: Lundell & Lundell 8140 (Ld). BELIZE: Dwyer & Pippin 10030 (Ac). BAHAMA ISLANDS: Great Exuma: Correll & Correll 42342 (N). Inagua: D. S. Correll 47404 (N). Long: S. R. Hill 2139 (N). CAYMAN ISLANDS: Grand Cayman: Sachet 459 (W—2774762); Stoddart 7013 (W—2773944). HISPANIOLA: Haiti: Ekman 8054 (Ld). PUERTO RICO: Stimson 3036 (Ld). COLOMBIA: Goajira: Romero-Castañeda 4496 (Ac). VENEZUELA: Zulia: Budowski 25 (Ac); H. M. Curran 254 (N).

AVICENNIA GERMINANS var. CUMANENSIS (H.B.K.) Moldenke

Additional bibliography: Moldenke, Phytologia 33: 255, 261, 262, 265—267, & 269 (1976) and 34: 256. 1976.

AVICENNIA GERMINANS var. GUAYAQUILENSIS (H.B.K.) Moldenke

Additional synonymy: Avicennia officinalis ♂ lanceolata Kuntze, Rev. Gen. Pl. 2: 502. 1891. Avicennia officinalis var. lanceolata Kuntze ex Moldenke, Prelim. Alph. List Invalid Names 6, in syn. 1940.

Additional bibliography: Moldenke, Phytologia 34: 74, 75, 202, 203, 255, 256, & 271 (1976) and 36: 31, 34, 41, & 410—412. 1977.

Recent collectors describe this plant as sometimes a bush or shrub, flowering when only 0.5 m. tall, and at other times a low or even tall tree, 2—25 m. tall, symmetrical in outline, with a trunk diameter of 30 cm., the bark "nondescript gray-brown" or gray, the leaves dark-green or very dark-green above, light-green beneath, coriaceous, shiny above, dull beneath, the flowers faintly fragrant, irregular, the calyx green, the corolla very weakly zygomorphic, with 4 lobes, the fruit green or light yellow-

green, and the "seeds germinating in fruit".

They have found it growing in shallow water, at the margins of salt ponds, in saltwater estuaries, close to tideline, in small ponds back of beaches, in the mud at the head of lagoons, "in open areas where sand is only slightly above tideline and where subsand is moist", on mud banks, and in wet alluvial clay immediately above the high-tide zone, from sealevel to 2 m. altitude.

The corollas are said to have been "white" on Asplund 16588, Haught 4855, and Von Hagen 8, "pale-lemon" on Kramer & Hekking 2092, "light-cream, the throat rich yellow-gold" on Simpson & Schunke V. 601, "creamish-white" on Lasseigne 4409, and "yellowish-white" on Holm-Nielsen & al. 7261.

Additional vernacular names reported for this plant are "black mangrove", "jelly", "mangle negro", "negrita", and "parwa". Stewart reports it "common on beaches and around salt lakes" on Charles Island; Haught reports it "very abundant in sandy soil near sea" in Antioquia; Pittier found it "common in mangrove formation" in Miranda. On Indefatigable Island Taylor says "This is the less frequent of the mangroves which are almost all Rhizophora; this forms tall trees, 40—50 feet tall, which show up above the shrub vegetation of the adjacent dry belt -- the only other trees of any size are Opuntia and a few Piscidia and Erythrina." Kramer & Hekking found it "very common in saline silt forming extensive woods" in Surinam.

The Smith & Smith 546 collection, from St. Vincent island, is most interesting because of its geographic location. The collectors assert that the tree was "locally common on the windward side [of the island], rare on leeward side, near the coast in forest or secondgrowth".

Some leaves of Sachet 459, from the Cayman Islands, closely resemble those of typical A. germinans. The Breteler collections are especially interesting — no. 4673 has typical guayaquilensis leaves; on 5178 they are blunt but narrow; on 5174 they are very long-pointed and very much like those of A. africana B. Beauv; those of 4677 are broad and very much like those of A. elliptica var. martii. Probably these collections were made deliberately because of the obvious differences in foliage characters. They are cited here tentatively. On Asplund 16588, Fournier 31, D. H. Knight 1032, Romero-Castafeda 7275, and some sheets of H. H. Smith 1937 they are much like those of typical A. germinans and probably should be so cited. The Drouet 2442 and Lanjouw & Lindeman 301 collections were previously cited by me as A. elliptica var. martii, but I now feel that they are better regarded as one of the many forms of A. germinans var. guayaquilensis; the same holds true for Ducke 9818.

Additional citations: WINDWARD ISLANDS: St. Vincent: Smith & Smith 546 (B, C). PEARL ISLANDS: San José: H. Kennedy 2281 (N). TRINIDAD AND TOBAGO: Trinidad: Kuntze s.n. [Trinidad, IV.74] (N).

COLOMBIA: Antioquia: Haught 4855 (N). Magdalena: Romero-Castafeda 7275 (Ac). VENEZUELA: Delta Amacuro: Budowski 98A-18 (Gz, N); H. M. Curran 2032 (N), 2032-19 (Kh, N). State undetermined: Robertson & Austin 213 [Alcaballo] (Ld). GUYANA: Irwin 542 (Au-178000). SURINAM: Kramer & Hekking 2092 (Ld); Lanjouw & Lindeman 301 (N, Ut-17661b); Lasseigne 4409 (N). ECUADOR: Guayas: Asplund 18188 (Ld, N, W--2652442); Fagerlind & Wibom 114 (Ld); Holm-Nielsen, Jeppesen, Løjtnant, & Øllgaard 7261 (N). Manabi: Asplund 16588 (Ld, N, S, W-2652442). GALAPAGOS ISLANDS: Charles: A. Stewart 3267 (N); Wiggins & Duncan 517 (Ld). Indefatigable: Chapin 1120 (N); Fournier 81 (Ac); D. H. Knight 1032 (Ac); T. W. J. Taylor T.T.91 (Gg-461253, N). James: Wiggins & Porter 287 (Ld). Narborough: F. R. Fosberg 44703 (Ld); Wiggins & Porter 201 (Ld). Santa Cruz: Von Hagen 8 (N, N, N), 809 (N); Wiggins 18310 (Ld). PERU: Tumbes: Simpson & Schunke Vigo 601 (N, W--2799283). BRAZIL: Bahia: Belém & Pinheiro 3039 (Ld). Ceará: Drouet 2442 (E-1110546, F-857471, F-949342, I, N, N, S, Sp-37514, W-1594848). Pará: Ducke 9818 [Herb. Mus. Rio Jan. 5407] (N).

AVICENNIA LANATA Ridl.

Additional bibliography: Hocking, Excerpt. Bot. A.28: 260. 1976; Moldenke, Phytologia 34: 75, 179, 201, 202, & 271. 1976.

AVICENNIA MARINA (Forsk.) Vierh.

Additional synonymy: Avicennia marina (Forssk.) Vierh. ex Bultman & Southwell, Biotropica 8 (2): 76, sphalm. 1976.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 46. 1858; Crozet, Voy. Tasmania [transl. Ling Roth] 5: 36. 1891; Fedde & Schust. in Just, Bot. Jahresber. 54 (2): 746. 1934; Gaussen, Viart, Legris, & Labroue, Trav. Sect. Scient. Techn. Inst. Franç. Pond. Hors Ser. 5: 25. 1965; Lamberti, Univ. São Paulo Fac. Filos. Bot. 317 [Bot. 23]: 120, 155, 159, & 160. 1969; Chai, Malays. Forest. 38: 188, 205, & 207. 1975; Bultman & Southwell, Biotropica 8 (2): 76 & 92. 1976; Moldenke, Phytologia 34: 70-72, 75-94, 167-170, 172-174, 176, 177, 179, 180, 185-189, 193-195, 197-203, 261-263, 265, 266, 268, & 271 (1976) and 36: 39, 410, & 411. 1977.

Recent collectors in Thailand refer to this plant as a tree, 7 m. tall, or a small shrub-like tree, 2-5 m. tall, the trunk gray, 30 cm. in diameter at breast height, the branches gray, the leaves green above, gray- or grayish-green beneath, the pneumatophores to 15 cm. tall, the calyxes green, and the fruit light-green. The corollas on Maxwell 75-917 are said to have been "orange" in color when fresh, on Sumithraarachchi DBS.696 "yellow", and on Van der Kevie 2 "yellow to orange". Maxwell refers to the plant as growing in the "muddy mangrove zone along rivers" and Van der Kevie reports it "very common on moderately firm soils of seashore".

Chai (1975) has studied this mangrove intensively in Malaysia and describes it as a "Shrublet (2 ft. tall) to medium-sized tree to

60 ft. tall. No buttresses, but slender, soft stilt roots may develop. Bark reddish-brown, flaking off in irregular, thin papery flakes revealing green new bark surface. Leaves more or less elliptic with blunt apices, lower surface glaucous, excreting salt. Fruit glaucous-green, more or less heart-shaped, slightly flattened. A pioneer species on new mud with a high proportion of sand but does not seem to colonise pure mud. At the mouth of the Bako river, it is slowly being replaced by A. alba. Found also along sandy shores where it is seen to be in poor form and never gregarious. Absent inland." In his key he distinguishes it from A. alba and A. officinalis as follows: "Small shrub (3 ft. tall) to big tree to 60 ft. tall; old bark grey pink or pinkish brown, coming off in patches of irregular thin flakes revealing green new bark; leaves elliptic, slightly whitish below; sandy soil". He calls it "api-api merah".

Collectors in Tanzania describe the species there as a branched tree, 9 meters tall, growing on the intertidal seashores at sea-level, the leaves about 12 cm. long and 7 cm. wide, the flowers axillary, the corollas yellow or orange-yellow, the petals 4 (or 5), and the stamens 4. They found it in flower there in December.

The Budowski 118-18, distributed as A. marina, seems to be A. schaueriana Stapf & Leechman rather than A. germinans (L.) L. as previously reported in this series of notes.

Additional citations: TANZANIA: Tanganyika: McCusker 221 (W-2727153); Mwasumbi LBM.10438 (W-2727154). SRI LANKA: Bernardi 15299 (Mu); Davidse 7561 (Ld); Faden s.n. [Jayasuriya 2413] (Ld); Sumithraarachchi DBS.696 (N, W-2804782). THAILAND: Larsen & Larsen 33784 (Ld); Maxwell 75-917 (Ac); Van der Kevie 2 (Ac).

AVICENNIA MARINA var. ACUTISSIMA Stapf & Moldenke

Additional bibliography: Moldenke, Phytologia 34: 167-169, 185, 194, 195, 201, & 262. 1976.

AVICENNIA MARINA var. RESINIFERA (Forst. f.) Bakh.

Additional bibliography: A. DC., Prodr. 11: 716. 1847; Buek, Gen. Spec. Syn. Candoll. 3: 46. 1858; Crozet, Voy. Tasmania [transl. Ling Roth] 5: 36. 1891; R. T. Baker, Journ. Proceed. Roy. Soc. N. S. Wales 49: 257-281. 1916; Kräusel in Just, Bot. Jahresber. 44: 759-760. 1924; Cambie, Journ. Roy. Soc. N. Zeal. 6 (3): 333. 1976; Moldenke, Phytologia 34: 169-180, 185, 195, 199-203, & 271 (1976) and 36: 39. 1977.

Dickson encountered this plant in salt marshes. Cambie (1976), quoting an unpublished thesis by Cheeseman (1964) in the University of Auckland library, reports the bark of this plant as containing "taraxerol, taraxerone, triptene hydrocarbons, taraxanthin, ferulic acid, caffeic acid, p-coumaric acid, [and] triacontane".

Additional citations: AUSTRALIA: Queensland: M. S. Clemens 42536a (M1). NEW ZEALAND: Pollen Island: Dickson s.n. [10.3.71] (Ac).

AVICENNIA MARINA var. *RUMPHIANA* (H. Hallier) Bakh.

Additional bibliography: Moldenke, *Phytologia* 34: 170, 172, 178--180, 185, 200, 203, 266, & 271. 1976.

AVICENNIA OFFICINALIS L.

Additional bibliography: Sweet, Hort. Brit., ed. 2, 419. 1830; Loud., Hort. Brit., ed. 2, 554. 1832; Sweet, Hort. Brit., ed. 3, 554. 1839; Buek, Gen. Spec. Syn. Candoll. 3: 46. 1858; R. T. Baker, Journ. Proceed. Roy. Soc. N. S. Wales 49: 257--281. 1916; Kräusel in Just, Bot. Jahresber. 44: 759--760. 1924; Fedde in Just, Bot. Jahresber. 44: 1377. 1927; Chai, Malays. Forest. 38: 188, 205, & 207. 1975; Moldenke, *Phytologia* 34: 167--172, 177, 179--203, 262, 267, 269, & 271 (1976) and 36: 410. 1977.

Don (1830), Sweet (1830), and Loudon (1832) all list what is probably this species (as "A. tomentosa") as cultivated in British gardens in their day [in greenhouses?], introduced from India in 1793. They call it the "downy-leaved avicennia".

Chai (1975) has studied this species intensively in Malaysia and describe it there as a "Small to medium-sized tree to 55 ft. tall. No buttresses but slender stilt roots may be present. Bark surface brownish-grey to chocolate-brown, lenticellate, may be narrowly cracked. Leaves spatulate or spoon-shaped, lower surfaces very light brown; salt excretion from upper surface. Fruits more or less heart-shaped, slightly flattened, beaked, covered in soft, brown tomentum. Commonly inland but not gregarious, along river or creek banks on stiff heavy soils, absent or very rare on the sea face. Associated with low and light crowned species like Nypa and young Rhizophora and Bruguiera." In his key he distinguishes it from A. alba and A. marina as follows: "Small tree to 55 ft. tall; bark grey to chocolate-brown, often lenticellate, leaves spatulate or oblong obovate, not whitish below; inland or on firm clay river banks." He calls it the "api-api sudu". Of particular interest is his observation that salt is excreted from the upper leaf-surface of this species, but from the lower surface in A. marina.

In Sri Lanka collectors describe A. officinalis as a shrub or small tree, 3--7 meters tall, with scaly bark, the corollas yellow or orange, and the petals and exerted stamens 4 in number. They have found it growing at the borders of or in mangrove forests.

The Fournier 81, distributed as A. officinalis and so filed in some herbaria, actually is A. germinans var. guayaquilensis (H.B.K.) Moldenke, while Sumthraarachchi DBS.696 is A. marina (Forsk.) Vierh.

Additional citations: SRI LANKA: Jayasuriya 1356 (W--2802165); Tirvengadam & Waas 465 (W--2768090). MALAYA: Singapore: McCusker 308 (Id).

AVICENNIA SCHAUERIANA Stapf & Leechman

Additional synonymy: Avicennia tomentosa Schar ex Wangerin in Just, Bot. Jahresber. 50 (1): 44. 1929 [not A. tomentosa Blanco,

1845, nor Blume, 1918, nor R. Br., 1851, nor Jack, 1945, nor Jacq., 1760, nor L., 1821, nor L. & Jacq., 1783, nor Lam., 1918, nor G. F. W. Mey., 1818, nor Millsp., 1930, nor Nutt., 1947, nor Nutt. & Br., 1832, nor Roxb., 1835, nor Sieber, 1844, nor Sw., 1864, nor Vahl, 1921, nor Wall., 1851, nor Weigelt, 1851, nor Willd., 1800]. Avicennia schauerana "Stapf et Leechman ex Moldenke" apud Townsend, Excerpt. Bot. A.4: 242 & 243. 1962. Avicennia schaueriana "Stapf & Leechman ex Moldenke" apud Angely, Fl. Anal. Paran., ed. 1, 581. 1965. Avicennia schaeeriana Lamberti, Univ. São Paulo Fac. Filos. Bol. 317 [Bot. 23]: 40, sphalm. 1969. Avicennia tomentosa sensu Marc. ex Moldenke, Fifth Summ. 1: 394, in syn. 1971. Avicennia schaueriana "Stapf et Leechmann ex Moldenke" apud Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 4: 841. 1971. Avicennia tomentosa Duarte ex Moldenke, Phytologia 28: 453, in syn. 1974. Avicennia schaueriana f. glabrescens Moldenke, Phytologia 34: 485, 1976. Avicennia schaeeriana Stapf & Lehm. ex Moldenke, Phytologia 36: 41, in syn. 1977.

Additional & emended bibliography: Schenck, Flora 72 [ser. 2, 44]: [83]—[89]. 1889; H. Hallier, Meded. Rijks Herb. Leid. 37: 87. 1918; Wangerin in Just, Bot. Jahresber. 50 (1): 44. 1929; Dansereau, Biogeogr. 132—134. 1957; Bascope, Bernardi, Jorgensen, Hueck, & Lamprecht, Inst. Forest. Latinoam. Invest. Capac. Descrip. Arb. Forest. 5, imp. 1, 13, 16, & 51. 1959; Braga, Fl. Nordest., ed. 2, 348. 1960; Reitz, Sellowia 13: 44/46 & 109. 1961; Townsend, Excerpt. Bot. A.41: 242 & 243. 1962; Melchior in Engl., Syllab. Pflanzenfam., ed. 12, 2: 438. 1964; Angely, Fl. Anal. Paran., ed. 1, 581. 1965; Hocking, Excerpt. Bot. A.13: 570. 1968; Moldenke, Phytologia 15: 478. 1968; Moldenke, Résumé Suppl. 16: 15 (1968) and 17: 8. 1968; Lamberti, Univ. São Paulo Fac. Filos. Bol. 317 [Bot. 23]: 40—46, 49—52, 55, 58—60, 76, 89, 102—104, 118, 121—124, 126—128, 136, 137, 143, 145, 147—149, 151, 153, 157—160, 167—175, 206, & 207, fig. 10—14, 17, 18, & 78—88. 1969; Bascope, Bernardi, Jorgensen, Hueck, & Lamprecht, Inst. Forest. Latinoam. Invest. Capac. Descrip. Arb. Forest. 5, imp. 2, 13, 16, & 51. 1970; Gibson, Fieldiana Bot. 24 (9): 177. 1970; Reitz, Sellowia 22: 17. 1970; Angely, Fl. Anal. Fitogeogr. Est. S. Paulo, ed. 1, 4: 841 & ii, map 1396. 1971; Moldenke, Fifth Summ. 1: 109, 111, 112, 129, 131, 147, 188, 393, & 394 (1971) and 2: 774 & 839. 1971; Odum, Fundament. Ecol., ed. 3, 347. 1971; V. J. Chapm., Trop. Ecol. 11: 5, 7, & 8, fig. 3. 1972; Moldenke, Phytologia 28: 453 (1974), 33: 255, 256, 258, 262, & 266 (1976), 34: 72, 75, 84, 170, 172, 180, 193, 200, 271, & 485 (1976), 35: 13 (1976), and 36: 31, 32, 34, 41, & 410. 1977; Moldenke, Biol. Abstr. 63: 2452. 1977.

Additional illustrations: Dansereau, Biogeogr. 134. 1957; Lamberti, Univ. São Paulo Fac. Filos. Bol. 317 [Bot. 23]: 49—52, 59, 60, & 168—175, fig. 10—14, 17, 18, & 78—88. 1969; Odum, Fundament. Ecol., ed. 3, 347. 1971.

This typical form of the species differs from the following one in having its leaf-blades completely glabrous on both surfaces.

Recent collectors describe the plant as a tree, 5—18 meters tall, the fragrant "flowers visited by flies", record the additional vernacular names, "black parwa", "mangle negro", and "siriuva", and have found it growing "in mangrove", on coastal banks, around lagoons, on salt flats, and "na areia", flowering from February to April and from June to October, fruiting in October. Many of the flowering specimens exhibit remarkably elongated floral axes with scattered flowers. Cowan & Forster report it a "locally frequent tree" in Trinidad.

The corollas are said to have been "white" on Araujo 1245, 1316a, & 1320 and on Cowan & Forster 1252, "whitish" or "alvacente" on Hatschbach 1920, 29144, & 38583, and "white with yellow interior" on Prance 21149.

The Angely (1971) work cited in the bibliography above is sometimes cited as "1970", the title-page date, but the work was not actually published until 1971.

Gooding (1965) cites Gooding 553 from Barbados, deposited in the British Museum herbarium. Broadway found the species on Grenada, while both Hahn and Plée found it on Martinique, so it seems apparent that it is not confined to northern and eastern South American coasts. This fact supports the possibility of A. germinans var. guayaquilensis having a similar distribution, since the methods of dispersal for both taxa are obviously identical.

Angely (1971) cites A. schaueriana from Maranhão, Ceará, Paraíba, Rio Grande do Norte, Pernambuco, Goiás, Bahia, Espírito Santo, Rio de Janeiro, São Paulo, Paraná, and Santa Catarina. Braga (1960) also lists it from Ceará.

Gibson (1970) makes the remarkable statement that A. bicolor Standl., of Central America, "closely resembles A. schaueriana Stapf & Leechman of the West Indies and South America, which differs only in having fewer, more congested, less complex inflorescences. If they should prove synonymous, the name A. bicolor Standley takes precedence". Actually, these two taxa are very distinct and almost impossible to confuse.

Schenck (1889) describes the plant now known as A. schaueriana as "A. tomentosa", referring to it only middle and south Brazilian specimens. His figures 1—6 on plate 3 of his work are sometimes cited as illustrative of this taxon, but actually (as he plainly states) they illustrate the unrelated Laguncularia racemosa.

Melchior (1964) erroneously implies that A. tomentosa Jacq. is a synonym of A. schaueriana. However, it seems most probable to me now that, in view of Stapf and Leechman's copious and careful field and herbarium notes (cfr. *Phytologia* 7: 283—286. 1960), Jacquin's A. tomentosa (1760) may actually be a synonym of what is now known as A. germinans var. cumanensis (H.B.K.) Moldenke, rather than of typical A. germinans (L.) L. as hitherto regarded by me and by many other authors.

It should be noted here that when I first proposed the name, A. schaueriana, based on the work of Stapf and Leechman, I gave as

synonyms "A. tomentosa Jacq." as used by Schauer in A. DC., Prodr. 11: 699—700 (1847) and many subsequent authors; A. nitida var. trinitensis Moldenke". I cited Britton 2595 in part, Broadway 5817 in part, and Trin. Bot. Gard. Herb. 2402, 5221, 5405 in part, 7988, 8695, 9516, 10461, 12651, & 12656, all from Trinidad, but none cited as the type.

Schauer (1847) describes what he calls A. tomentosa Jacq. as having "foliis obovate-ellipticis obtusissimis in petiolum attenuatis supra demum subnitidis subtus candicantibus aetate interdum glabrescentibus....Folia 3 poll. longa, 15—18 lin. lata, facie demum glabrata neque admodum nitida, subtus indumento demum abolescente induta, siccando decolorescentia neque vero nigrescentia." He cites from Rio de Janeiro: Gaudichaud s.n., Pohl s.n., Riedel s.n., from Bahia: Blanchet 1427, Martius 108, Salzmann 430, from Colombia: Humboldt & Bonpland s.n. [Cumana], from the West Indies: Jacquin s.n., Perrottet s.n., from Mexico: Humboldt & Bonpland s.n., and from Ecuador: Gaudichaud s.n., Humboldt & Bonpland s.n. Obviously, both his description and his cited material include representatives of several taxa. No type was designated, but it is to be assumed that Jacquin's collection from the West Indies is the type of the true A. tomentosa Jacq. and this is usually regarded as conspecific with typical A. germinans (L.) L. Schauer's description does not apply to Jacquin's plant but apparently applies to a mixture of the pubescent- and glabrous-leaved forms of A. schaueriana.

My A. nitida var. trinitensis is validated by a designated type: R. L. Brooks s.n. [Herb. Trin. Bot. Gard. 12656] from the Caroni Swamp, Trinidad, collected on May 29, 1932, and deposited in the Britton Herbarium at the New York Botanical Garden. This collection can, therefore, also be regarded as the type of typical A. schaueriana.

Avicennia schaueriana f. glabrescens, based on R. C. Marshall s.n. [Herb. Trin. Bot. Gard. Herb. 12651], was described before it was realized that the actual type of this species is the glabrous-leaved form. It is a straight and unequivocal synonym of typical A. schaueriana. All material previously cited by me in this series of notes as f. glabrescens should be shifted back to typical A. schaueriana.

Material of A. schaueriana has been widely misidentified and distributed in herbaria as A. germinans (L.) L., A. nitida Jacq., and A. tomentosa Jacq. Some of the collections cited below (e.g., N. L. Britton 2595, Hahn 759, and Othmer s.n. [17/XI/03] were previously erroneously cited by me as A. germinans. Araujo 1316, Dusén 202, and Riedel & Luschnath 1007, as originally distributed, are mixtures of typical A. schaueriana and f. candicans, so it seems probable that, at least in Rio de Janeiro, the two forms grow in very close proximity to each other. Hatschbach 14076, dis-

tributed as typical A. schaueriana, seems better placed as f. candicans. The Sellow s.n. [Brasilia] in the Britton Herbarium actually is Vitex schaueriana Moldenke.

Additional & amended citations: TRINIDAD AND TOBAGO: Trinidad: N. L. Britton 2595 (W--119444); Cowan & Forster 1252 (N, W--2287738, Z); R. C. Marshall s.n. [Herb. Trin. Bot. Gard. 12651] (N, R); Othmer 157 (Mu). TRINIDAD OFFSHORE ISLANDS: Patos: Britton, Hazen, & Mendelson 541 (N, W--1047019). VENEZUELA: Delta Amacuro: Budowski 118-18 (Gz, Kh, N). BRAZIL: Guanabara: Duarte 5017 [Herb. Brad. 12117; Herb. Jard. Bot. Rio Jan. 110275] (Mu, N, W--2650229). Pará: Prance 21149 (Ld). Paraná: Hatschbach 1920 (N), 29144 (N, S), 38583 (Mu). Rio de Janeiro: Araujo 1207 [Herb. FEEMA 12144] (Ld), 1245 [Herb. FEEMA 12285] (Ld), 1316a (Ac), 1320 [Herb. FEEMA 12330] (Pf); Nadeaud s.n. [Victhersby, XI.1862] (N, W--2547120); Riedel & Luschnath 1007b (N). Gobernador Island: G. Pabst 7385 [Herb. Brad. 27668] (Mu, N, N). Havarata Island: J. Vidal s.n. [Herb. Rio Jan. 31546] (N).

AVICENNIA SCHAUERIANA f. CANDICANS Moldenke, Phytologia 35: 15. 1976.

Bibliography: Moldenke, Phytologia 35: 15 (1976) and 36: 31, 32, 34, & 410. 1977.

This form differs from the typical form of the species in having the lower surface of its leaf-blades more or less very densely canescent-puberulent or farinaceous in the manner of A. germinans (L.) L. and its varieties.

Collectors describe this plant as a shrub or small tree, 1-17 meters tall, the trunk to 12.5 cm. in diameter at breast height, with pneumatophores. The corollas are said to have been "white" on Araujo 1244 & 1316, Pabst 5421, Pickel 3210, and Reitz 5525 and merely "whitish" on Hatschbach 14096 and Hatschbach & Guimarães 21397. It has been found growing in the mangrove formation in coastal regions, in salt water, in littoral and mangrove swamps, restinga, coastal ridges and muddy beaches, on "ground sometimes covered by high tide", along creeks of partially salt water, and in "banhado salgado", at altitudes of 1-5 m., flowering from February to April and June to December, fruiting in May. Froes reports that it furnishes "good lumber and fuel". Vasconcelos Sobrinho 251 includes a photograph of the collection locality. Araujo reports the tree as frequent and the flowers as fragrant, noting that the "folhas cobertas de um indumento acinzentado na superfície inferior".

Vernacular names reported for this form are "blaka parwa", "ciriba preta", "ciriuba", "fromarina", "mangue", "mangue canoé", "mangue seriva", "mangue siriba", "siriuba", and "siriuva".

Araujo 1316, Dusén 202, Lützelburg 401, and Riedel & Luschnath 1007, as originally distributed, are mixtures of this and the typical form of the species.

Material of A. schaueriana f. candicans has been misidentified and distributed in many herbaria as A. elliptica Thunb., A. nitida Jacq., typical A. schaueriana Stapf & Leechman, "A. schaueriana Stapf & Lehm.", and A. tomentosa Jacq.

It would appear that this form is a highly inconstant one. The underside of the leaves on Lützelburg 16059 and s.n. [Caji, XII. 1910] exhibit very obscure puberulence, a condition also seen on Martius s.n. [in litt. oceani ad Soteropolisi et Ilheos, Jan. 1819]. On Lützelburg 12521 and s.n. [VIII.1912], Martius s.n. [inter Rhizophoras ad litt. oceani prope Rio], and Othmer s.n. [17. XI.03] some of the (mostly smaller) leaves are subglabrous, glabrate, or practically glabrous.

In a previous publication (1960) I erroneously cited specimens of Blanchet 1427, Gaudichaud s.n. [Rio Janeiro], and Luschnath s.n. [Martius 108] as "cotypes" of A. schaueriana merely because they were cited by Schauer (1847) in his mis-application of Jacquin's "A. tomentosa". However, as pointed out under A. schaueriana in the present installment of these notes, A. schaueriana should be typified by the same collection which typifies A. nitida var. trinitensis and not by any of the many collections cited by Schauer which actually represent several different taxa.

Citations: TRINIDAD AND TOBAGO: Trinidad: Othmer s.n. [17/XI/03] (Mu—4054). GUYANA: Leechman s.n. [near Georgetown, 1917] (N, N). SURINAM: Geijskes s.n. [5-II-1943] (N). BRAZIL: Bahia: Lützelburg 401 in part (Mu, Mu), s.n. [VIII.1912] (Mu, N—photo, Z—photo); Martius s.n. [in maritimis prov. Bahiensis, 1819] (Mu—1690), s.n. [in litt. oceani ad Soteropolisi et Ilheos, Jan. 1819] (Mu—1082). Ceará: Dias da Rocha 108 [Herb. Inst. Bot. S. Paulo 7933] (N, Sp—7933); Drouet 2548 (E—1110545, F—857467, F—949348, N, S, W—1594887). Guanabara: Moldenke & Moldenke 19606 (F—isotype, Mg—isotype, Mr—isotype, N—type, No—isotype, Ot—isotype, S—isotype, Sm—isotype, Ss—isotype). Maranhão: Fröes 1812 (B, Bm, Cb, Cb, E—1042134, F—707083, I, K, M1, N, P, S, Ut, W—1660151). Paraíba: Lützelburg 12521 (Mu). Paraná: Dusén s.n. [Herb. Mus. Nac. Rio Jan. 5004] (N); Hatschbach 14096 (Ac, Mu, N, W—2564872, Ws); Hatschbach & Guimarães 21397 (M1, N); Stellfeld 799 [Herb. Mus. Paran. 1799] (N). Pernambuco: Vasconcelos Sobrinho 251 [photo 136] (It, N, Ug). Rio de Janeiro: Araujo 1141 [Herb. Inst. Conserv. Nat. 11687] (Fe), 1244 [Herb. FEEMA 12286] (Ld), 1310 [Herb. FEEMA 12329] (Ac), 1316 (Ld); Dusén 202 in part (W—1055656); Gaudichaud 464 (B, Br, Cb, Dc, N); Glaziou 1362 (Br, Br, Br, Br, Cp, Cp, F—667195, It, K, N, P); Herb. Mus. Nac. 6 (C), s.n. [Sebastianopolis] (C); Herb. Mus. Nac. Rio Jan. 31572 (N), 31775 (N); F. C. Hoehne s.n. [Herb. Inst. Bot. S. Paulo 24908] (N, Sp—24908); Luschnath s.n. [Herb. Martius 108] (Br, Dc, K, M, Mu—1081, P, V); Lützelburg 16059 (Mu), s.n. [Caju, XII.1910] (Mu,

N--photo, Z--photo); Martius s.n. [inter Rhizophoras ad litt. oceani prope Rio] (Mu--1084); Riedel & Luschnath 1007a (N); Sellow 304 (N); Wilkes U. S. Expl. Exped. s.n. (T, W--59278, W--59279). Santa Catarina: Reitz 5525 (N); Reitz & Klein 683 [Herb. Barb. Rodr. 6961] (N, S, W--2123175, W--2281838), 1414 (W--2142574). São Paulo: F. C. Hoehne s.n. [Herb. Inst. Bot. S. Paulo 30854] (It, K, N, Sp); Löfgren s.n. [Herb. Com. Geogr. & Geol. 3062; Herb. Inst. Bot. S. Paulo 15596] (N, Sp); Pickel 3210 (It, N, Sf); A. Saint-Hilaire C2.7665 [1665] (N, P); Usteri s.n. [Herb. Inst. Bot. S. Paulo 15598] (N, Sp). Florianopolis Island: Rambo 50320 (Lm, N, S). Governador Island: Lanna Sobrinho 1905 [Herb. FEEMA 8469] (Z); G. Pabst 5421 [Herb. Erad. 21211] (Mu, N). Pinheiros Island: Azevedo 3 [Herb. Inst. Conserv. Nat. 10329] (Fe). Santa Catarina Island: Reitz 5088 [Herb. Barb. Rodr. 6363] (N).

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Additional bibliography: Bascope, Bernardi, Jorgensen, Hueck, & Lamprecht, Inst. Forest. Latinoam. Invest. Capac. Descrip. Arb. Forest. 5, imp. 1, 13, 17, & 51. 1959; Hocking, Excerpt. Bot. A. 12: 425. 1967; Moldenke, Biol. Abstr. 49: 4199. 1968; Bascope, Bernardi, Jorgensen, Hueck, & Lamprecht, Inst. Forest. Latinoam. Invest. Capac. Descrip. Arb. Forest. 5, imp. 2, 13, 17, & 51. 1970; V. J. Chapm., Trop. Ecol. 11: 5, fig. 3. 1970; Moldenke, Fifth Summ. 1: 87, 115, & 394 (1971) and 2: 839. 1971; Moldenke in Woodson, Schery, & al., Ann. Mo. Bot. Gard. 60: 150, 153, & 154. 1973; "H. R.", Biol. Abstr. 57: 1904. 1974; Moldenke, Phytologia 32: 438 (1975), 33: 269 (1976), and 34: 74. 1976; Hocking, Excerpt. Bot. A. 26: 422. 1976.

The Killip & Cuatrecasas 38660 collection, cited below, was previously incorrectly cited as A. germinans (L.) L.

Collectors report that A. tonduzii is "a tree sometimes 20 m. tall", the corollas white, and have found it growing in swamps, flowering in March and June. The Kupper 1552, distributed as A. tonduzii, actually is A. germinans var. guayaquilensis (H.B.K.) Moldenke, a very closely related taxon. It is probable that some, if not all, of the very long- and narrow-leaved collections cited as the latter are, in fact, better placed as A. tonduzii. The two taxa require much more intensive study, especially in the field.